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REMARKS

Claims 1 and 7-14 are presently pending in this application. Claims 1 and 7-8 have

been amended to more particularly define the claimed invention.

It is noted that <u>the amendments are made only to more particularly define the</u>

<u>invention and not for distinguishing the invention over the prior art, for narrowing the scope</u>

<u>of the claims, or for any reason related to a statutory requirement for patentability</u>. It is

further noted that, notwithstanding any claim amendments made herein, Applicant's intent is

to encompass equivalents of all claim elements, even if amended herein or later during

prosecution.

Applicant gratefully acknowledges the Examiner's indication that claims 13-14

would be <u>allowable</u> if rewritten in independent form. However, Applicant submits that all of

the claims are allowable.

Claims 1 and 8-12 stand rejected under 35 U.S.C. §102(b) as being unpatentable over

Takasaki et al., U.S. Pat. No. 5,631,829.

Claim 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Takasaki

et al., U.S. Pat. No. 5,631,829, further in view of Katayama et al., U.S. Pat. Pub. No.

2003/0036837.

These rejections are respectfully traversed in view of the following discussion.

I.   APPLICANT'S CLAIMED INVENTION

The claimed invention (as defined, for example, by independent claim 1) is directed to

a driving force distribution control device for a vehicle for controlling engaging force of a

coupling mechanism so as to change transmission torque, thereby distributing driving force,

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the device including, means for determining a mounting of a nonstandard-diameter tire,

means for continuously changing a torque limiter which limits engaging force of the coupling

mechanism, from a limiter value in an ordinary control state according to a driving state, to a

limiter value in a specific control state at the time of determining the mounting of a

nonstandard-diameter tire. Additionally, there is means for controlling engaging force of the

coupling mechanism so as to be kept below the limiter value of the torque limiter in every

control state, and means for setting amount-of-change of the torque limiter per time increment

at transition from the ordinary control state to the specific control state and amount-of-change

of the torque limiter per time increment at recovery from the specific control state to the

ordinary control state such that the latter may be relatively larger than the former.

Conventionally, driving force transmission systems for four-wheel-drive vehicles have

coupling mechanisms made up of a multiple disc clutch disposed within a transfer case, and

controlling engaging torque of this coupling mechanism continuously controls distribution of

driving force toward the rear wheel side. However, the conventional torque limiter fixes the

transmission torque at a constant value, so in the event of mounting nonstandard-diameter

tires or in the event of performing specific control in a state wherein oil temperature of the

differential (especially the rear differential) rises abnormally, deterioration of driving

performance is brought about, and also in the event of transition from an ordinary control

state to a specific control state or in the event of switching of the control state at recovery

from the specific control state to the ordinary control state, the engaging torque is drastically

changed, thereby causing problems such as deterioration for driving stability and driving

performance, (Application at page 1, line 15 to page 2, line 20).

The claimed invention, on the other hand, includes <u>means for continuously changing a</u>

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torque limiter which limits engaging force of said coupling mechanism, from a limiter value

in an ordinary control state according to a driving state, to a limiter value in a specific control

state (e.g., at the time of mounting nonstandard-diameter tires, as recited in claim 1).

Another exemplary aspect of the claimed invention, as defined by claim 7, includes

means for setting amount-of-change of the torque limiter per time increment at transition

from the ordinary control state to the specific control state and amount-of-change of the

torque limiter per time increment at recovery from the specific control state to the ordinary

control state such that the former may be relatively larger than the latter.

Furthermore, another exemplary aspect of the claimed invention, as defined by claim

8, includes means for setting amount-of-change of the torque limiter per time increment at

transition from the ordinary control state to the specific control state and amount-of-change of

the torque limiter per time increment at recovery from the specific control state to the

ordinary control state such that the former and the latter may be substantially equal at the low

speed range of the vehicle.

These above features allow the present invention to help avoid excessive change of

torque at transition between the ordinary control state and the specific control state, and

reduce adverse effects on driving stability and driving performance under the specific control

state, (Application at page 15, lines 1-6).

II.   THE ALLEGED PRIOR ART REJECTIONS

A.   35 U.S.C. § 102(b) Rejection over Takasaki et al., U.S. Pat. No. 5,631,829

The Examiner alleges that Takasaki et al., U.S. Pat. No. 5,631,829, (Takasaki),

teaches the invention of claims 1 and 8-12.

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With respect to independent claim 1, Applicant submits, however, that Takasaki does

not teach or suggest:

"*means for determining the mounting of a nonstandard-diameter tire,*

means for continuously changing a torque limiter...to a limiter value in a specific

control state at the time of determining the mounting of a nonstandard-diameter tire," and,

"*means for setting amount-of-change of the torque limiter per time increment at*

transition from the ordinary control state to the specific control state and amount-of-change

of the torque limiter per time increment at recovery from the specific control state to the

ordinary control state such that the latter may be relatively larger than the former."

The Examiner is under a misapprehension of the relation of the front-wheel side

torque-distribution limiting value TLIM and the front-wheel side torque-distribution

command value TI in Fig. 6 of Takasaki.

Takasaki neither discloses nor suggests any relationship as to which is larger or

smaller or are substantially equal among amount-of-change of the torque limiter per time

increment at transition from the ordinary control state to the specific control state, amount-of-

change of the torque limited per time increment at recovery from the specific control state to

the ordinary control state at the like as in the present invention.

It is noted that the invention of Takasaki aims to suppress the energy loss due to a

large slip of the main drive wheel when the drive force is interrupted in a short period of time

such as at the time of a gear change operation of the four-wheel drive car. The front-wheel

side torque-distribution limiting value TLIM is smaller than the reference front-wheel side

torque-distribution command value T1 during accelerating driving (acceleration), and it is set

somewhat larger than the reference front-wheel side torque-distribution command value T1

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during the steady running or during the decelerating driving (deceleration of the car). In case

the reference front-wheel torque-distribution command value TI abruptly decreases

accompanying the abrupt decrease in the speed difference Δ N between the front wheel and

the rear wheel caused when the drive force is interrupted in the short period of time such as at

the time of the gear change operation, the front-wheel side torque-distribution limiting value

TLIM is set to the front-wheel side torque-distribution command value T2, thereby to reduce

the drive force distribution to the main drive wheel (rear wheel) side and suppress the energy

loss due to the slip loss.

Furthermore, nowhere in Takasaki is there any teaching or suggestion for any means

to determine the mounting of a nonstandard-diameter tire. Takasaki is primarily concerned

with deviation in rotational conditions between front and a rear road wheels, such as rapid

increase or decrease in the wheel speed difference between the front and rear wheels,

(column 4, lines 35-42), and not rotational conditions between two dissimilar sized tires.

Accordingly, since Takasaki fails to teach or suggest means for determining the

mounting of the nonstandard-diameter tire, therefore, Takasaki fails to teach or *suggest means*

for continuously changing a torque limiter from a limiter value in an ordinary control state to

a limiter value in a specific control state at the time of determining the mounting of the

nonstandard-diameter tire.

Furthermore, the Office Action fails to address, and Takasaki fails to teach or suggest

means for setting amount-of-change of the torque limiter per time increment at transition

from the ordinary control state to the specific control state and amount-of-change of the

torque limiter per time increment at recovery from the specific control state to the ordinary

control state such that the latter may be relatively larger than the former, as defined by claim

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1.

Illustration (A), below, graphically demonstrates an exemplary aspect of Applicant's

claimed invention. The <u>transition</u> from an ordinary state to a specific state has an amount-of-

change of the torque limiter per value of time increment is represented by L_{Trans}/T_{Trans}.

Additionally, the <u>recovery</u> from the specific state to the ordinary state has an amount-of-

change of the torque limiter per value of time increment is represented by L_{Rec}/T_{Rec}. Claim 1

recites that amount-of-change of the torque limiter per value of time increment at the recovery

(L_{Rec}/T_{Rec}) <u>*may be relatively larger*</u> than the amount-of-change of the torque limiter per value

of time increment at the transition (L_{Trans}/T_{Trans}), thus following the expression (L_{Trans}/T_{Trans}) <

(L_{Rec}/T_{Rec}).
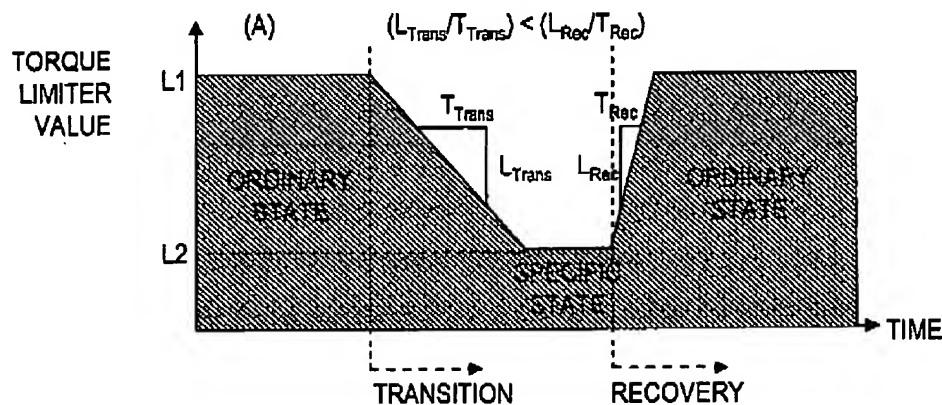
Nowhere in Takasaki is there any teaching or suggestion <u>of different rates of change</u>

<u>of a torque limiter value between a transition period and a recovery period,</u> much less, a rate

of change of the torque limiter value <u>in a recovery period being greater</u> than a rate of change

of the torque limiter value <u>in a transition period</u>.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this

rejection since the alleged prior art reference fails to teach or suggest each and every element

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and feature of Applicant's claimed invention.

With respect to independent claim 8, Applicant submits, however, that Takasaki does

not teach or suggest:

"means for continuously changing a torque limiter, which limits engaging force of the

coupling mechanism, from a limiter value in an ordinary control state according to a driving

state to a limiter value in a specific control state that protects a driving force transmission

system," and,

"means for setting amount-of-change of the torque limiter per time increment at

transition from the ordinary control state to the specific control state and amount-of-change

of the torque limiter per time increment at recovery from the specific control state to the

ordinary control state such that the former and the latter may be substantially equal at the

low speed range of the vehicle."

The Examiner states that Takasaki's disclosure or a rapid increase or decrease in the

wheel speed difference between front and rear wheels, as recited in column 4, lines 35-42,

teaches Applicant's claimed language of *a limiter value in a specific control state for*

protecting a driving force transmission system. Applicant fails to see any correlation of

Takasaki's disclosure regarding the wheel speed difference between front and rear wheels

with Applicant's *specific control state for protecting a driving force transmission system.*

Additionally, the Examiner fails to disclose where Takasaki teaches or suggests *a limiter*

value in ordinary control state according to a driving state, as differentiated from *a limiter*

value in a specific control state that protects a driving force transmission system.

Furthermore, the Examiner fails to address and Takasaki fails to teach or suggest

means for setting amount-of-change of the torque limiter per time increment at transition

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from the ordinary control state to the specific control state and amount-of-change of the

torque limiter per time increment at recovery from the specific control state to the ordinary

control state such that the former and the latter may be substantially equal at the low speed

range of the vehicle.

Illustration (B), below, graphically demonstrates an exemplary aspect of Applicant's

claimed invention. A transition from an ordinary state to a specific state has an amount-of-

change of the torque limiter per value of time increment is represented by L_{Trans}/T_{Trans}.

Additionally, a recovery from the specific state to the ordinary state has an amount-of-change

of the torque limiter per value of time increment is represented by L_{Rec}/T_{Rec}. Claim 8 recites

that an amount-of-change of the torque limiter per value of time increment at the recovery

(L_{Rec}/T_{Rec}) *may be substantially equal* to the amount-of-change of the torque limiter per value

of time increment at the transition (L_{Trans}/T_{Trans}), thus following the expression (L_{Trans}/T_{Trans}) =

(L_{Rec}/T_{Rec}).
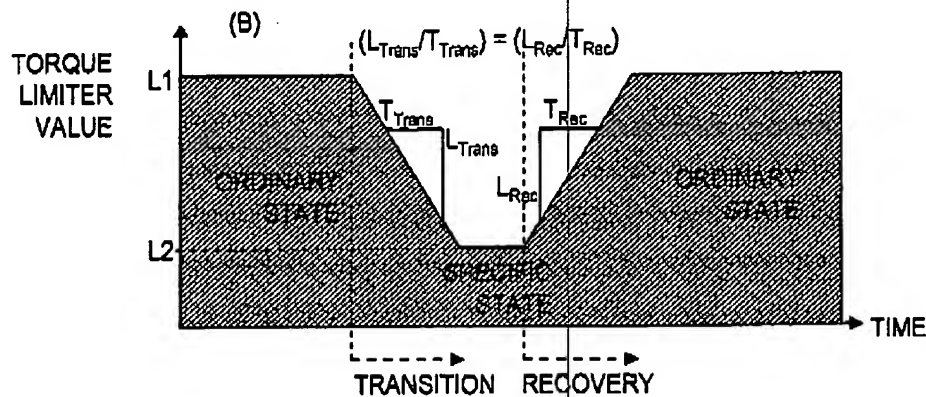
Nowhere in Takasaki is there any teaching or suggestion of an amount-of-change of a

torque limiter value being equal between *a transition period* in a specific control state *for*

protecting a driving force transmission system and *a recovery period from a specific control*

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state *for protecting a driving force transmission system to an ordinary control state.*

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this

rejection since the alleged prior art reference fails to teach or suggest each and every element

and feature of Applicant's claimed invention.

**B.   35 U.S.C. § 103(a) Rejection over Takasaki et al., U.S. Pat. No. 5,631,829
        in view of Katayama et al., U.S. Pat. Pub. No. 2003/0036837**

The Examiner alleges that Takasaki et al., U.S. Pat. No. 5,631,829, (Takasaki), in

view of Katayama et al., U.S. Pat. Pub. No. 2003/0036837, (Katayama), teaches the invention

of claim 7.

The Examiner alleges that one of ordinary skill in the art would have been motivated

to modify Takasaki with the teaching from Katayama to form the invention of claim 7.

Applicant submits, however that these references would not have been combined and even if

combined, the combination would not teach or suggest each and every element of the claimed

invention.

Applicant respectfully submits that Takasaki would not have been combined with

Katayama as alleged by the Examiner. Indeed, these references are non-analogous because

they are unrelated. (Takasaki relates to an automobile driving torque distribution control

system for controlling a torque distribution between front and rear drive wheels, and

specifically to a control system for four-wheel drive vehicles which system is capable of

determining a driving torque distribution ratio between front and rear drive wheels depending

on a wheel speed difference or a revolution speed difference between the front and rear road

wheels, whereas, Katayama relates to driving force controlling apparatus and method for a

four-wheel drive vehicle in which a front-and-rear road wheel driving force distribution

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control system which variably controls a distribution ratio of a front-and-rear road wheel

driving force according to an engagement control of a frictional clutch is mounted), and no

person of ordinary skill in the art would have considered combining these disparate

references, absent impermissible hindsight.

In fact, Applicant submits that the Examiner can point to no motivation or suggestion

in the references to urge the combination as alleged by the Examiner.

Therefore, Applicant respectfully submits that one of ordinary skill in the art would

not have been so motivated to combine the references as alleged by the Examiner. Therefore,

the Examiner has failed to make a prima facie case of obviousness.

Furthermore, Applicant submits, that Takasaki in view of Katayama does not teach or

suggest, "*means for setting amount-of-change of the torque limiter per time increment at*

transition from the ordinary control state to the specific control state and amount-of-change

of the torque limiter per time increment at recovery from the specific control state to the

ordinary control state such that the former may be relatively larger than the latter."

Katayama teaches that a TCS controller 29 determines whether clutch estimated

temperature Temp according to the estimation temperature is lower than a preset threshold

value β. If the temperature is not lower than the preset threshold value, the routine goes to

step S17 wherein a clutch engagement force RQ_TRQ to be issued from TCS controller 29 to

4WD controller 31 for the vehicle to approach to the 2WD state is not requested. (Paragraph

[0095].) In summary, Katayama merely teaches when a temperature is determined to be

above a preset value, the TCS controller 29 is prevented from requesting the vehicle to enter a

2 wheel drive control state.

However, neither Katayama, nor Takasaki teaches or suggests setting an amount-of-

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change of the torque limiter per time increment, (that is the rate of change of the torque

limiter), at transition from an ordinary control state to a specific control state, and an amount-

of-change of the torque limiter per time increment at recovery from the specific control state

to the ordinary control state, such that the amount-of-change of the torque limiter per time

increment at transition from the ordinary control state *may be relatively larger* than the

amount-of-change of the torque limiter per time increment at recovery from the specific

control state.

Illustration (C), below, graphically demonstrates an exemplary aspect of Applicant's

claimed invention. The transition from an ordinary state to a specific state has an amount-of-

change of the torque limiter per value of time increment is represented by L_{Trans}/T_{Trans}.

Additionally, the recovery from the specific state to the ordinary state has an amount-of-

change of the torque limiter per value of time increment is represented by L_{Rec}/T_{Rec}. Claim 7

recites that the amount-of-change of the torque limiter per value of time increment at the

transition (L_{Trans}/T_{Trans}) *may be relatively larger* than the amount-of-change of the torque

limiter per value of time increment at the recovery (L_{Rec}/T_{Rec}), thus following the expression

(L_{Trans}/T_{Trans}) > (L_{Rec}/T_{Rec}).
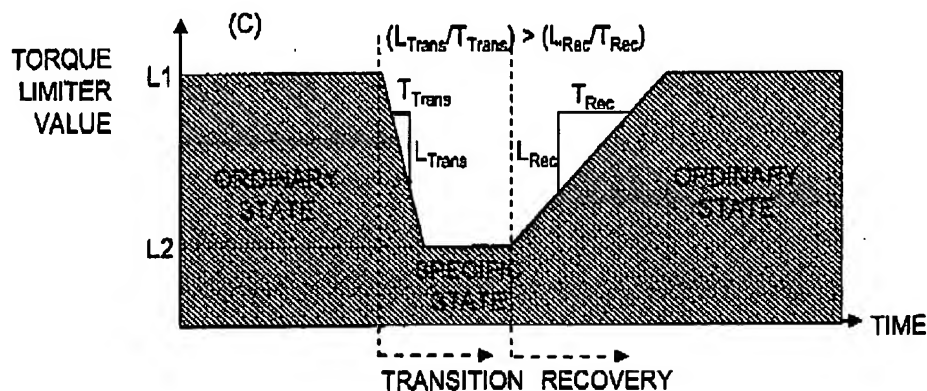
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Therefore, neither Takasaki, nor Katayama, nor any alleged combination thereof

teaches or suggests, "*means for setting amount-of-change of the torque limiter per time*

increment at transition from the ordinary control state to the specific control state and

amount-of-change of the torque limiter per time increment at recovery from the specific

control state to the ordinary control state such that the former may be relatively larger than

the latter.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this

rejection since the alleged prior art reference fails to teach or suggest each and every element

and feature of Applicant's claimed invention.

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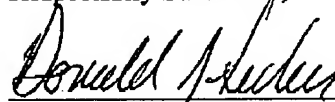## III.   FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1 and 7-14, the claims

presently pending in the application, are patentably distinct over the prior art of record and are

in condition for allowance. The Examiner is respectfully requested to pass the above

application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance,

the Examiner is requested to contact the undersigned at the local telephone number listed

below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit

any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

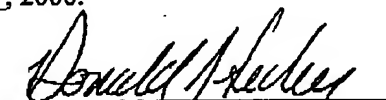Date: _May 10, 2006_

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing was filed by facsimile with the United States Patent
and Trademark Office, Examiner BEHNCKE, Group Art Unit # 3661 at fax number 571-273-
8300 this _10_ day of _May_, 2006.

Donald J. Lecher
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